

Central Bucks School District  
AP Statistics: High School Final Review

**Final Exam Practice Problems – Unit 4 – Part 2 (Chapters 17-18)**

**Formulas: If  $X$  has a binomial distribution with parameters  $n$  and  $p$  then:**

$$\mu_X = np \text{ and } \sigma_X = \sqrt{np(1-p)} \quad \mu_{\hat{p}} = p \text{ and } \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}} \quad P(X=k) = \binom{n}{k} p^k (1-p)^{n-k} = \text{binompdf}(n,p,k)$$

1. A family is planning on having 6 children. Find the probability that the family will have:
  - a. Exactly 2 boys.
  - b. At least 2 boys.
  - c. Less than 5 boys.
  - d. All boys.
  - e. After the family has their 6 children (2 girls and 4 boys), they decide to have one more child. What is the probability that the next child will be a boy?
2. The standard deviation of the weights of a very large population of students is 10.0 pounds and the mean is 130 pounds. A sample of 200 students is obtained from the population. What are the mean, standard deviation, and variance of the sampling distribution?
3. The score that a student receives on an entrance exam is a normally distributed random variable with a mean of 543 and a variance of 961. If a score of at least 582 is needed to be accepted at the college of the student's choice, what is the probability that the student will be accepted? What is the probability that the student scores between 557 and 568? What is the probability that a group of 20 students will average between 557 and 568?
4. State the Central Limit Theorem.
5. The mean math SAT score for all CB West seniors is 522 with a standard deviation of 30. The distribution of all scores are skewed to the left. A sampling distribution of \_\_\_\_\_ is to be created by selecting samples of 50 students and finding their average math SAT score. Describe the sampling distribution (shape, center, spread – use numbers for the center and spread).
6. Of the coral reef species on the Great Barrier Reef off Australia, 73% are poisonous. If a tourist boat taking divers to different points off the reef encounters 25 coral reef species, what are the mean and standard deviation for the expected number of poisonous species seen?
7. A cleaning service wishes to survey local business regarding how they can improve their customer service. The probability of response to the survey is 0.89. The survey is sent to 95 businesses.
  - a. What is the expected number of businesses that will respond?
  - b. What is the standard deviation and variance of the number of businesses that will respond?
  - c. Can you use the normal approximation to the binomial for this scenario?
  - d. What is the probability that 58 businesses will respond?
  - e. What is the probability that 50 or less will respond?
  - f. What is the probability that less than 80 will respond?
  - g. What is the probability that more than 88 will respond?
8. For Company A, the average number of sick days taken per year is 5.4 with a standard deviation of 1.2. In a random sample of 40 employees, what is the probability that the mean number of sick days taken per year is less than 5?